J. E. ANGER.

VEHICLE SPRING.

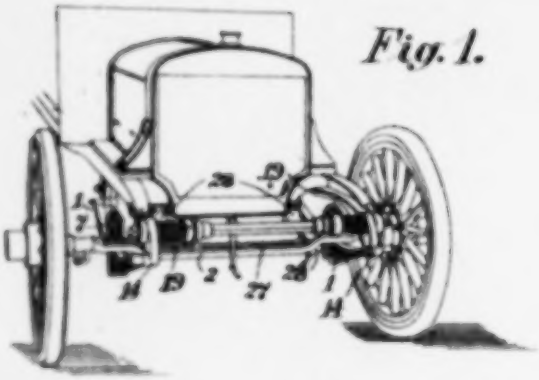
APPLICATION FILED JULY 20, 1910.

1,031,612.

Patented July 2, 1912.

3 SHEETS-SHEET 1.

Fig. 1.



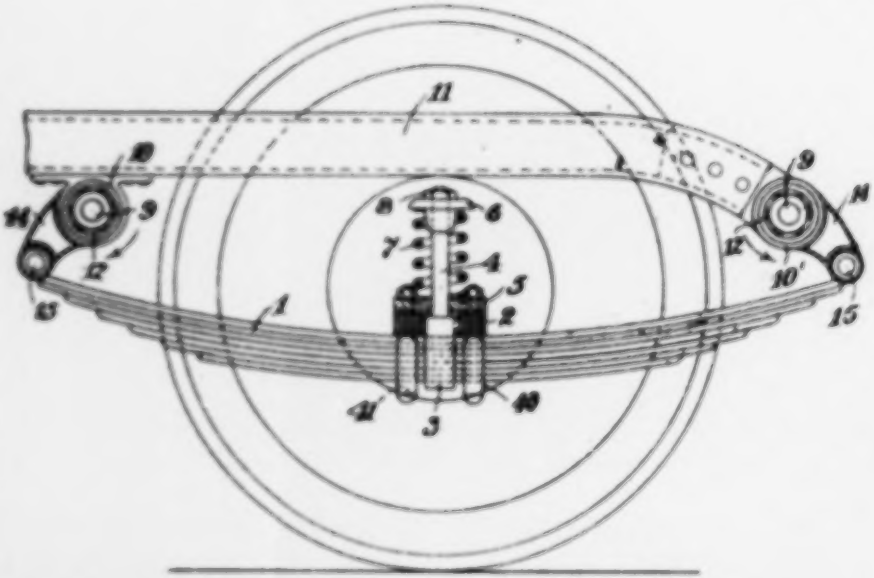


Fig. 2.

Witnesses

Bruce P. Brenton

Albert Popham

Inventor

John E. Anger

By Sturtevant & Mason

Attys.

J. E. ANGER.

VEHICLE SPRING.

APPLICATION FILED JULY 20, 1910.

1,031,612.

Patented July 2, 1912.

3 SHEETS—SHEET 1.

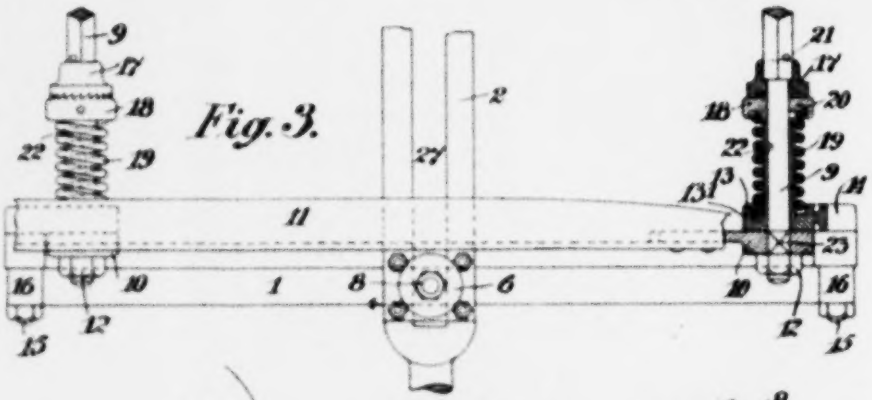


Fig. 3.

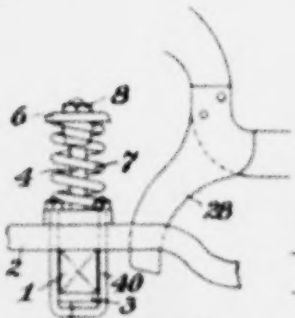


Fig. 6.

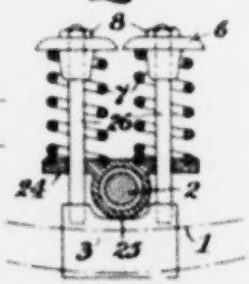


Fig. 7.

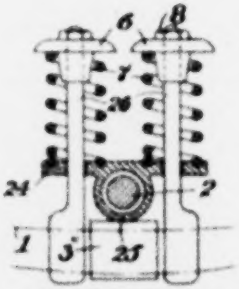


Fig. 8.

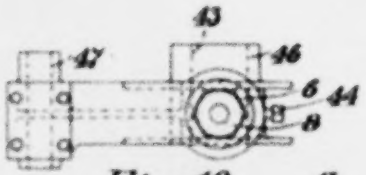


Fig. 10.

Fig. 4.

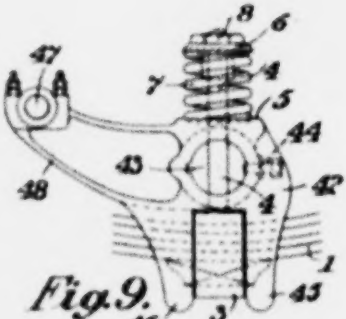


Fig. 9.

Witnesses

Grace P. Brereton

Albert Popkins

Inventor

John E. Anger

By Sturtevant & Hueson

Attys

J. E. ANGER.

VEHICLE SPRING.

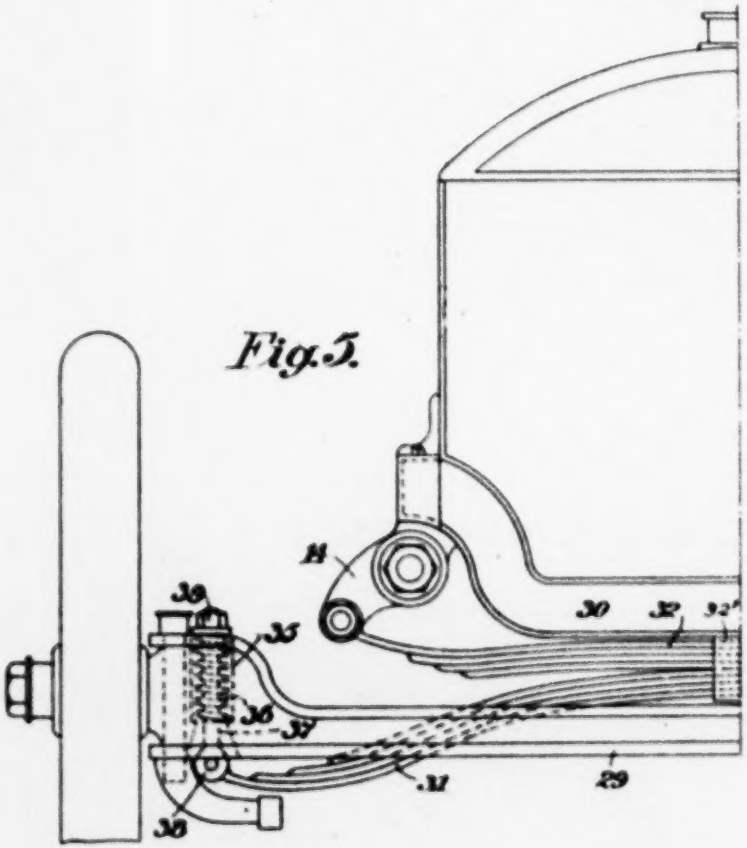
APPLICATION FILED JULY 30, 1910.

1,031,612.

Patented July 2, 1912.

3 SHEETS—SHEET 3.

Fig. 5.



Witnesses

Grace P. Brenton

Albert Popkins

Inventor

John E. Anger

By Sturtevant & Mason

Attys

UNITED STATES PATENT OFFICE.

JOHN EDWARD ANGER, OF PRESTON, ENGLAND.

VEHICLE-SPRING.

1,031,612. Specification of Letters Patent. Patented July 2, 1912.

Application filed July 20, 1910. Serial No. 572,826.

To all whom it may concern:

Be it known that I, JOHN EDWARD ANGER, a citizen of the United States of America, residing at Preston, in the county of Lancaster and Kingdom of England, have invented certain new and useful Improvements in Vehicle-Springs, of which the following is a specification.

This invention relates to springs or spring devices for road vehicles, the object being to more effectually secure smoothness and uniformity of motion, absorb vibrations and concussions, such as are experienced when a vehicle is traveling along a road, also enable the springs to be adjusted to vary the resiliency to suit circumstances.

The invention is specially, though not exclusively, applicable to motor road vehicles.

The invention will be understood from the following description, reference being had to the accompanying drawings, in which:—

Figure 1 is a perspective view of the front of a vehicle with my invention applied thereto; Fig. 2 is a side elevation of my spring arrangement applied to a non-rotating axle of a road vehicle; Fig. 3, a plan view thereof; Fig. 4, a side view of the crank arm; Fig. 5, a front view of a motor road vehicle, showing the application of my torsion spring device when transversely arranged laminated springs are used in connection with the front axle; Fig. 6, a front view of my resilient and adjustable spring carrier and guide horn; Figs. 7 and 8, front views of my invention applied to a live axle; Fig. 9, a side view showing my invention applied to the stationary back axle, and the provision of a casting for strengthening the axle and carrying the brake band; Fig. 10, a plan view.

By the present invention, I provide the laminated spring for absorbing the greater road shocks, vertical spiral springs to absorb the lesser ones, and transverse spirals to act as spring checks, as well as shock absorbers, so that excessive reaction or bounding is checked, and last but not least, both vertical and transverse springs are adjustable for load, and for regulating the reaction of the springing system as a whole.

Referring first to Figs. 1, 2, 3, 4 and 6, 1 are the laminated springs secured to, or suspended from, the axle 2 at their center, and their leaves are bound together at the center by a strap 3. The strap 3 is provided with an upstanding rod or extension piece 4 which passes through a hole in the axle 2 and through holes in the top and bottom spring caps 5 and 6. Between these caps is placed a spiral spring 7, which can be compressed or expanded by turning a nut 8 on the top of the upper spring cap 6. The bottom spring cap 5 rests on and is secured to the axle 2. By screwing up the nut 8 on the top spring cap 6, the laminated spring 1 is drawn up against the under side of the axle 2, so as to be held against it, but in a resilient manner. A resilient and adjustable quick acting spring is thus formed which absorbs all the ordinary rapid road shocks and can be adjusted by the nut at the top, so as to give the desired flexibility. The spring 1 being carried by the spring 7, all small road shocks are absorbed at the axle, and never pass through the whole length of the laminated spring. At each end, the laminated springs are coupled by pins 15 to levers 14, around the sleeves 22 of which is wound the spiral torsion spring 19. One end of the spring is made fast to it at 13′ and the other end is attached to the loose collar 18 which has teeth engaging similar teeth on a collar 17 secured to the spindle 9. These teeth are inclined like ratchet teeth in such a manner that the loose collar 18 can be revolved to pass the teeth on the fixed collar 17 in one direction only, so as to allow any desired tension to be put on the torsional spring. The crank arms 14 in their normal position lie approximately diagonal, and the weight of the vehicle is transmitted through the crank arms 14 to the laminated springs 1, also to the spiral torsion springs 19 turning the cranks in the direction of the arrows, and bending the laminated springs 1, also apply a greater or less twist to the torsion springs 19. Their torsion being opposed to the action of the laminated spring, tends to force the wheel to the ground, and supports the load, whenever the wheel drops from it by following the road. These torsional springs overcome all the unpleasantness of being thrown about by the reaction of springs when passing over bad roads, and hold the wheels to the road, thus saving wear of tires and allowing full power and effort to the engine to be transmitted through the wheels to the chassis frame. Much of the wear on back tires is caused by grinding away the rubber or studs when the wheel momentarily leaves

or nearly leaves the road surface, but with the present invention, the springs really hold the wheels to the road. The spindles 9 on which the crank arms 14 are loosely mounted are secured in dumb irons or brackets 10, 10', secured to the frame 11 and made fast by nuts 12. To decrease the resiliency of the torsion springs, the collars 18 to which one end of the torsion springs 19 is attached, are turned in a direction contrary to that of the arrows by a spanner or lever, so that its inclined teeth will slide past the clutch teeth on the fixed collar 17, and so give a greater twist to the spiral spring 19. The teeth on the fixed collar acting like detents, will prevent the return of the loose collar 18, and so the spiral spring 19 is held highly twisted. This will lessen its resiliency. To increase its resiliency the fixed collar 17 is unlocked by removing the pin 21 and sliding the collar 17 on the squared part of the shaft 9, so as to release or slacken the twist of the spring 19. In this way the resilience of the torsional springs 19 is made adjustable to suit circumstances, such as variations of the load, or the degree of roughness or smoothness of the road along which the vehicle is traveling. Whether the vehicle is lightly loaded or heavily loaded, the concussions will be absorbed by the springs 1, 7 and 19, and smoothness of running obtained, so that if desired solid tires can be used instead of pneumatic ones.

I wish it to be understood that I do not confine myself to using a single spiral spring 7 in connection with each laminated spring 1. Twin springs might for example be used. If the axle 2 is a live one as shown in Figs. 7 and 8, seats 24 would be arranged on the casing or journal boxes 25 of the axle, that is one on each side of a vertical line passing through the axle. Projecting upwardly from the strap 3' (Fig. 7) and fastened thereto are a pair of rods or extensions 26, which pass through guide holes in the seats 24 and through holes in the top spring caps 6, and between the seats and caps are placed the twin spiral springs 7. In Fig. 8 the rods 26 pass around the laminated springs at their lower ends instead of being secured to the spring strap 3''. In both cases the laminated spring 1 is drawn up against the axle casing 25 and held against it by the spiral springs 7, and in both cases also the play is restricted by the holes in the seatings 24 through which the rods 26 pass, to a vertical movement. The action is the same as before, and the tension of the springs 7 is so adjusted as to just carry the load and hold the laminated spring against the casing or journal boxes 25. But, when the wheel rides over an obstruction or falls into a cavity, the spiral springs to some extent absorb the shock and vibration instead of the whole force of the shock coming upon the laminated springs.

In order to get a lateral movement of the body, plus the spring controlled up and down movement already described, and yet prevent backward movement of the axle independently of the chassis and body, I make the front axle 2 with an elongated longitudinal slot 27 in it, Figs. 1 and 3, and attach to the frame a pair of horns or extensions, one of which is shown at 28, Fig. 6, and both of which are shown in Fig. 1. These pass vertically through the elongated slot 27, in the axle, and permit lateral movement of the chassis through the horns being allowed to play in the elongated slots. The body and its chassis is centralized between the wheels by the springs 1, so that there is very little swing when traveling along a straight course, but when the car is being steered around a curve, then the springs give sufficiently to permit of this lateral movement of the horns along the slot, the chassis however being cushioned against lateral jars by the springs 1 and 7 while full freedom for vertical movement is allowed for by the down coming horns which are in a vertical plane. At the same time these horns absolutely prevent the shock of the wheels (in a fast running vehicle) when striking an obstruction, from throwing the wheel and axle, with the laminated springs and the spiral ones, momentarily backward. This throwing of the wheel backward if permitted, must wear the tread of the tires, since it is in the opposite direction to the forward movement of the wheels, and the greater the backward movement, the greater will be the slipping or wearing of the tread on the road surface. The horns or extensions 28 engaging the longitudinal slot or division in the axle, entirely prevent this backward movement, when the wheel strikes an obstruction, while at the same time permitting of lateral play, to allow of the body accommodating itself in a yieldable manner and relieving the occupants of a car from any sudden shock when turning a curve. The desirability of having a lateral cushion or play for relieving the severe shock caused by the sudden deviation from a straight course, is almost as important as having a vertical cushion or play for absorbing shocks due to inequalities in the road surface.

The laminated spring for absorbing the greater road shocks, the vertical spiral springs to absorb the lesser ones, and the transverse spirals to act as spring checks as well as shock absorbers, so that excessive reaction or bounding is checked, can equally well be applied to the front or rear axle. When however it is desired to arrange the laminated springs transversely instead of longitudinally, the arrangement shown in Fig. 8 might be used. In this 29 is the

front axle, 30 the underframe of the vehicle, 31 the main laminated spring which is combined with the compensating spring 32 also laminated, and either nearly straight or of opposite curvatures. The spring 32 is fastened to the main one 31 at mid-length by the strap 32' and its ends are coupled respectively to the crank and torsional spring arrangement 14 which latter has been already described in connection with Figs. 1, 2 and 3. The main laminated spring 31 at mid-length, is located above the axle 29, and the said axle is divided for part of its length, that is, provided with an opening at mid-width to allow for the main laminated spring 31 to pass through the axle from above, and engage with a projecting eye 38 on the under side of the axle near the axle journals on which the wheel is mounted. 35 is a pocket or cavity proceeding downwardly from the top of the axle. In this pocket 35 is placed the vertical spiral spring 36 which is seated on the bottom of the said cavity, and through the spring passes a bolt 37 having the eye 38 at the bottom end, which is coupled to the ends of the transverse laminated bearing spring 31, while at the upper end, the eye bolts 37 have a washer, or a follower and nut 39 bearing upon the top of the spiral spring 36. The nut 39 provides means for adjusting the tension of the spring 36. Hence the load is borne by the laminated springs 31 and 32, for absorbing the greater shocks, the vertical spirals 36 to absorb the lesser ones, and the transverse spirals acted on by the levers 14 to act as spring checks.

The object of hanging the spring from below the axle as described, instead of from the upper side as hitherto, is to secure a low hung car without in any way interfering with the springiness, or absorption of vibration.

Referring now to Figs. 9 and 10, 3 is the strap which binds the leaves of the spring 1 together, 4 an upstanding rod which passes through a hole in the axle, and through the casting 42, the latter having a hole 43 through which the stationary axle passes, and is fixed thereto by a key and by a set pin 44. The depending arms 45 of the casting straddle the spring 1, and between the seating 5 and the cap 6 is placed the spring 7. One object of using this casting is to prevent lateral movement of the spring 1 independently of the axle and restrict the play to the axial line of the rod 4, and hence serve a similar purpose to the arrangements described with reference to Figs. 2 and 8. Another object is to give strength to the axle 2 which might be weakened by the hole for the passage of the rod 4. On this casting is a sleeve 46 for further strengthening the axle through being weakened by the hole for the rod 4, and a lateral arm 48 which forms a support or bracket for the shaft which operates the brake band, for which purpose it is provided with journal bearings 47. The action of the springs 1 and 7 is the same as that already described with reference to Fig. 2.

I declare that what I claim is:—

1. In spring bearing devices for road vehicles, the combination of the laminated spring or springs arranged below the axle for absorbing the greater road shocks, a bolt passing upward from its center strap through the axle, vertical coiled springs seated on or in connection with the axle from which springs the bolt is suspended, transverse spirals supported inside the vehicle frame on shafts and their inner ends attached thereto, and short levers connecting the outer ends of the said transverse spirals to the ends of the laminated springs, said transverse spirals being made to act or unwind very rapidly for the purpose of causing the laminated springs to recover themselves, and keep the wheels to the road however quickly a succession of obstructions are encountered, whereby tire slip is reduced.

2. In spring bearing devices for road vehicles, the combination of a laminated spring or springs for absorbing the greater road shocks, vertical spiral spring or springs seated on or in connection with the axle to absorb the lesser ones, spindles made fast to the vehicle, cranks mounted thereon and coupled at the ends to each laminated spring, a spiral spring in connection with each crank to act as spring check to prevent excessive reaction or bounding, said spirals being placed lengthwise on the spindle and made fast at one end to the boss of the crank, while the other end is made fast to a loose collar, said collar having ratchet teeth on one face engaging corresponding teeth on the opposing face of a fixed collar in such manner that the loose collar can be revolved in one direction to tighten the spring, but be prevented from turning back.

3. In spring bearing devices for road vehicles having non-rotating axles, the combination with the laminated spring located at mid-length below the axle, of an upstanding rod projecting from its center strap and passing through the axle, a spiral spring seated on the axle through which the said rod passes, a cap and nut at the top of the rod for compressing the spiral spring and holding the laminated one up against the axle, and safety or guide links secured to the axle and passing around the laminated spring with a clearance between, substantially as described.

4. In a spring device for road vehicles, the combination of a laminated spring for absorbing the greater shocks, cranks connected to the ends of said spring, torsion springs acting on said cranks, a coil spring

above the center of the laminated spring, an axle between the coil spring and the laminated spring, means carried by the coil spring for supporting the laminated spring, and means for varying the tension of said coiled spring.

5. In a spring device for road vehicles, the combination of a laminated spring for absorbing the greater shocks, cranks connected to the ends of said springs, torsion springs acting on said cranks, ratchet teeth devices for varying the torsion of said springs, a coil spring above the center of the laminated spring, an axle between the coil spring and the laminated spring and supporting the coil spring, means carried by the coil spring for supporting the laminated spring, and means for adjusting the tension of said center coil spring.

6. In a spring device for road vehicles, the combination of a laminated spring for absorbing the greater shocks, torsion springs acting upon the ends of said spring, a coil spring above the center of the laminated spring, an axle between the coil spring and the laminated spring, and supporting the coil spring, means carried by the coil spring for supporting the laminated spring, and means whereby the coil spring is put out of action and the laminated spring supported by the axle.

In witness whereof, I have hereunto signed my name this 12 day of July, 1910, in the presence of two subscribing witnesses.

JOHN EDWARD ANGER.

Witnesses:
G. C. DYMOND,
JOHN MCLACHLAN.

W. STORRIE.

SHOCK ABSORBER.

APPLICATION FILED MAR. 10, 1914.

1,279,035.

Patented Sept. 17, 1918.

Fig. 2.

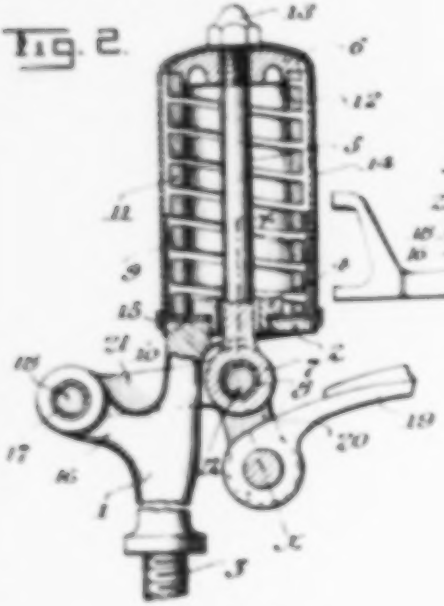


Fig. 1.

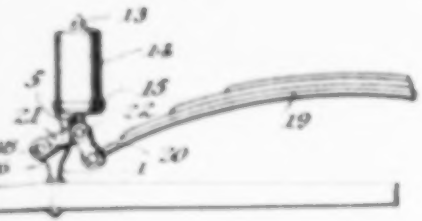
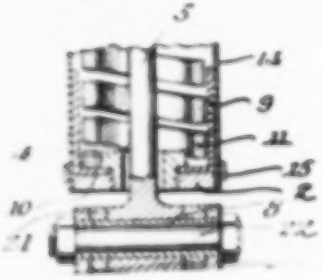


Fig. 3.

Fig. 4.



UNITED STATES PATENT OFFICE.

WILLIAM STORRIE, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE K-W IGNITION COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SHOCK-ABSORBER.

1,279,035. Specification of Letters Patent. Patented Sept. 17, 1918.

Application filed March 18, 1914. Serial No. 825,568.

To all whom it may concern:

Be it known that I, WILLIAM STORRIE, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Shock-Absorbers, of which the following is a specification.

The present invention relates to means for absorbing the vibrations and shocks in vehicle springs to such an extent as not to cause annoyance to the rider and strain to the springs of the vehicle, which would tend to cause such springs to crack or otherwise become disabled.

The invention provides a shock absorber embodying an expansible helical spring and supporting means therefor of novel formation, one of such supports being secured to the axle and the other being shackled or otherwise attached to the vehicle spring, the parts being arranged to control the vibrations or shocks not taken up quick enough by the main spring and thereby overcome the objectionable features herein mentioned.

The invention also provides a device which supplements the action of the main spring of the vehicle and also serves to neutralize the vibration and other shocks which are not ordinarily taken up by the main spring of the vehicle and which tend to add to the inconvenience of the rider.

The invention also further provides an appliance which while acting as a shock absorber does not interfere with the maximum movements of the main spring and which is of such construction as not to be materially affected by side movement which would tend ordinarily to produce ineffective action and cause lateral strain and render the efficiency of the device comparatively short-lived.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated and claimed.

In the drawings hereto attached:—

Figure 1 is a detail view showing the application of the invention.

Fig. 2 is a vertical section.

Fig. 3 is a top plan view.

Fig. 4 is a section on the line *x—x* of Fig. 2 looking in the direction of the arrow.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawing, by the same reference characters.

The device comprises a bracket which is adapted to be secured to the axle, a rod adapted to be connected by means of a shackle or otherwise to the vehicle spring and bracket, and an interposed expansible helical spring. The bracket comprises an arm 1 and base 2, said arm being adapted to be secured to the axle of the vehicle in any manner as by means of a threaded shank 3. The base 2 is arranged to occupy an approximately horizontal position and is formed with a central opening in which is fitted a bushing 4 which retains the spring seat, shell 9. The rod 5 extends vertically and is provided at its upper end with a yoke 6 and at its lower end with an eye 7 which extends transversely and receives a bushing 8. A shell 9 is mounted upon the base 2 and is provided at its lower end with an inturned flange 10 which is confined between the base 2 and an outer flange at the upper end of the bushing 4. The shell 9 receives the lower portion of an expansible, helical spring 11 which is supported upon the base of the bracket. The spring 11 rests upon the inturned flange 10 and is prevented from lateral movement by means of the shell 9. The yoke is secured to the upper end of the rod 5 in any manner and rests upon the spring 11 and is retained in position thereon against lateral displacement by means of a raised portion 12 which enters a spring 11. As shown the upper end of the rod 5 is threaded and passes through an opening of the yoke 6 and receives a nut 13. A housing 14 consisting of a shell incloses the spring and shell 9 and extends over the yoke 6 and serves to exclude foreign matter from the spring and to prevent the escape of any lubricant applied to such spring and the shell 9. The housing 14 moves with the yoke 6 and rod 5, and is strengthened at its lower end by means of a band 15 which also gives a finished appearance thereto.

The arm of the bracket 1 has an offset portion 16 in which is formed a transverse opening to receive a bushing 17 and pin 18. The vehicle spring 19 is connected by means of a shackle or links 20 with the rod 5 and other links 21. Under normal conditions

the links 20 have an upright position and the links 21 a horizontal arrangement. A pin 22 connects the links 20 and 21 and the rod 5. The bushing 8 mounted upon the pin 22 passes through the eye 7 of the rod 5 and through the openings of the links 21. The links 20 and 21 have a toggle arrangement and admit of the spring 11 supplementing the action of the spring 19 as also providing for the neutralizing of shock and vibration with the result that the occupant of the vehicle experiences comfort in riding and the vehicle is free from jar which ordinarily would add materially to the wear of the parts.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the invention as claimed.

Having thus described the invention, what is claimed as new is:—

1. In combination, a support embodying a base and an off standing portion, a yieldable device mounted upon the said base, a connection suspended from the yieldable device and passing therethrough and through the base, links embracing the support and the off standing portion thereof and pivotally connected at one end to such off standing portion and at its opposite end to the before mentioned connection and other links connecting the vehicle spring with the first mentioned links and the said connection, said links having a toggle arrangement.

2. A device of the character set forth, comprising a bracket embodying an arm, base, and off standing portion, said base having an opening, a flanged bushing fitted in the opening of the base, a shell mounted upon the base and having an inturned flange which is confined thereto by means of the flanged bushing, an expansible helical spring mounted upon the base, a rod passing through the spring and base and having an eye at its lower end, a yoke connected to the upper end of said rod and mounted upon the spring, a housing inclosing the yoke, spring, and shell links embracing the arm and off standing portion of the bracket and pivoted at one end to such off standing portion, of two classes of springs arranged substantially in the plane of said axle, one being a substantially horizontal leaf spring and the other a coil spring substantially in the vertical, the former connected to the radius link by a shackle, and the latter carrying a rod connected to the radius link and supported by said support, substantially as and for the purposes described.

4. In a vehicle spring suspension device, the combination, with an axle, a support secured thereto, and a radius link pivoted to said support, of two classes of springs arranged substantially in the plane of said axle, one being a substantially horizontal leaf spring and the other a coil spring substantially in the vertical, the former connected to the radius link and the latter carrying a rod connected to the radius link and supported by said support.

5. In a vehicle spring suspension device, a support, said support having a shoulder and an extension of less width than the shoulder, said extension being adapted for mounting in a vehicle axle a resilient element seated upon said support, a member engaging an end of the resilient element and adapted to move toward the support to compress the resilient element against the support, means connected with the said member and adapted for connection to a vehicle spring, and a radius link pivotally connected to the support and to said means.

6. A vehicle spring suspension comprising a support having a base part extending substantially at right angles to the support, said support also having a shoulder and an extension of less width than the shoulder, said extension being adapted for mounting in a vehicle axle, a resilient element seated upon the base which forms an abutment against which said element may be compressed, a yoke engaging an end of the resilient element, a rod extending longitudinally with respect to the resilient element, and a radius link pivoted to the support and to the rod.

7. In combination, an axle, a support secured to the axle, a resilient element seated upon the support which forms an abutment against which said element may be compressed, a vehicle spring extending substantially parallel with the axle, a member engaging an end of the resilient element, means connecting the said member with the spring and a radius link pivotally connected to the support and to the said means for the purpose described.

8. In combination, an axle, a support

ement toward and against the support, a ehicle spring extending substantially parllel with the axle of the vehicle, means for nnecting the said rod with the end of the pring, and a radius link pivoted to the suport and to the rod for the purpose deribed.

9. In combination, an axle, a support nounted upon the axle, said support having base with an opening therethrough, a esilient member mounted upon said base hich serves as an abutment against which he resilient element is compressed, and a oke engaging an end of the resilient memer, a rod secured to the yoke and extending xially through the resilient member and hrough the opening in the said base, saill upport having a projecting portion, a adius link pivotally mounted upon the said rojection and upon the end of the rod, vehicle spring extending substantially arallel with the axle, and a toggle link onnecting the end of the spring to the end f the rod.

10. A vehicle spring suspension device omprising a support, a resilient element eated upon the support, a member engagng the resilient element, a member operaively connected to an end of the spring nd adapted for connection to a vehicle pring, a radius link pivotally connected to he support and to the last mentioned memer and a casing surrounding the resilient element and mounted to move with the resilient element.

11. A vehicle spring suspension device comprising a support having an extension, a resilient element seated upon said extension, a yoke engaging the resilient member, a rod connected to the yoke and adapted for connection with a vehicle spring, a radius link pivotally connected to the support and to the last mentioned member and a casing surrounding the resilient element and mounted to move with the resilient element.

12. A vehicle spring suspension device comprising a support having an extension, a casing upon said extension, a resilient element having an end portion mounted within said casing, a yoke member engaging the said resilient member, a second casing surrounding the upper part of the resilient member and telescoping with the first mentioned casing, a rod secured to the yoke and extending axially through the resilient element and adapted at its free end for connection with a vehicle spring, and a radius link pivotally connected with the support and with the said rod for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM STORRIE.

Witnesses:
W. W. Wilson,
Frederick H. Bratesman.

R. P. & W. S. THOMPSON.

AUTOMOBILE.

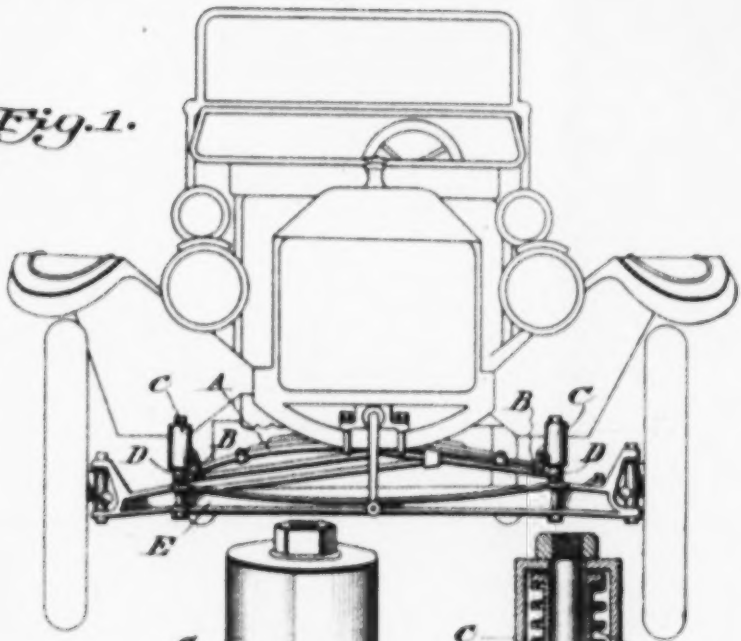
APPLICATION FILED OCT. 10, 1912.

1,072,791.

Patented Sept. 9, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



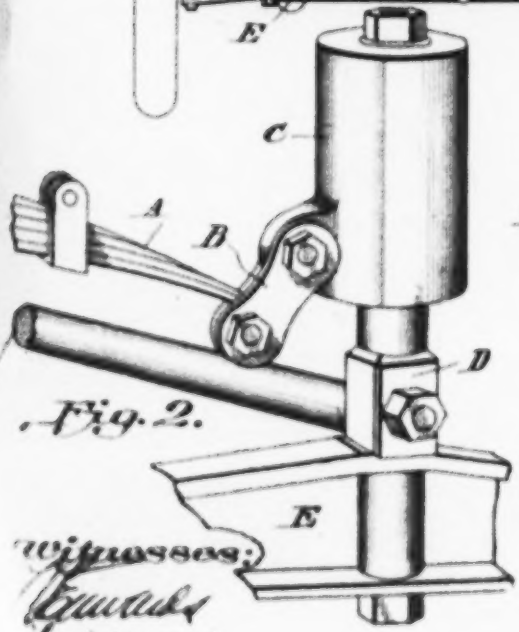


Fig. 2.

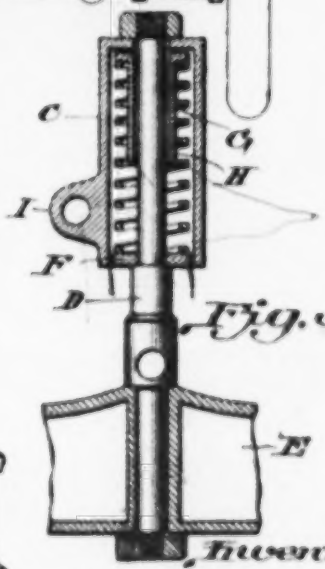


Fig. 3.

Witnesses:

Inventors

Ralph P. Thompson

William S. Thompson

R. P. & W. S. THOMPSON.

AUTOMOBILE.

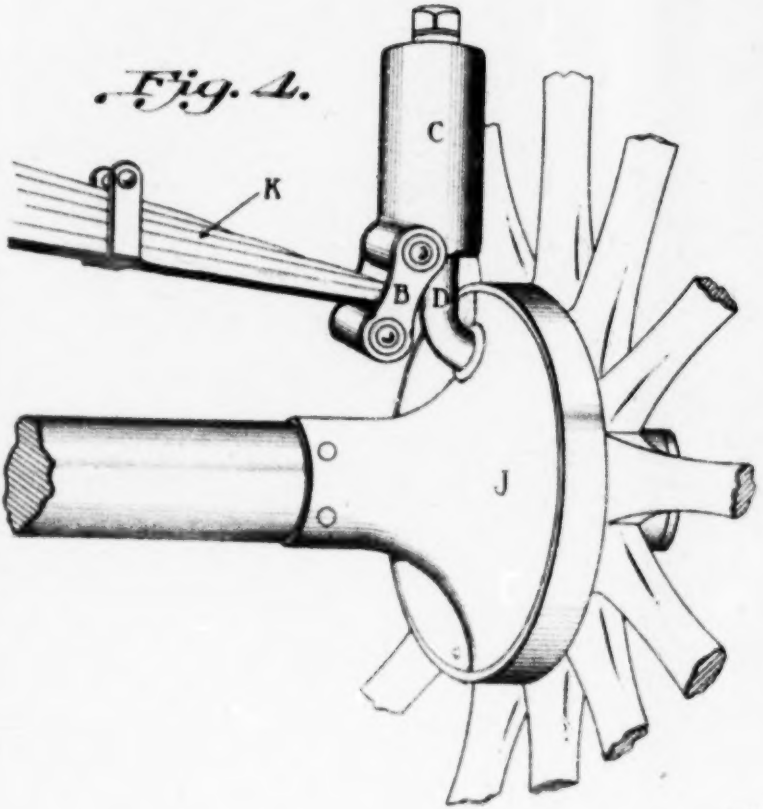
APPLICATION FILED OCT. 10, 1912.

1,072,791

Patented Sept. 9, 1913.

2 SHEETS—SHEET 2.

Fig. 4.



Witnesses:

John Sharp
Ry Davis

Inventor

Ralph P. Thompson
William S. Thompson

UNITED STATES PATENT OFFICE.

RALPH P. THOMPSON AND WILLIAM S. THOMPSON, OF LEIPSIC, OHIO, ASSIGNORS OF ONE-THIRD TO OLIVER P. EDWARDS, OF LEIPSIC, OHIO.

AUTOMOBILE.

1,072,791. Specification of Letters Patent. Patented Sept. 9, 1913.

Application filed October 10, 1908. Serial No. 756,979.

To all whom it may concern:

Be it known that we, RALPH P. THOMPSON and WILLIAM S. THOMPSON, citizens of the United States, residing at Leipsic, county of Putnam, and State of Ohio, have invented certain new and useful Improvements in Automobiles, of which the following is a specification.

This invention relates to the spring suspension for automobiles.

The object of our invention is to provide efficient means for steering shafts to the road wheels, thereby making the car more easily riding.

A further object is to separate the spring element into sets of members, each set acting in unison, but in which a difference exists between the members of each set in the time of commencement and recoil, for the purpose of causing the spring movement to have the nature of a series of pulsations and of explosions with each other, and therefore serving to be absorbed within the spring element itself, vibrations that would otherwise be transmitted to the car frame. We accomplish this by the use of the slow acting friction rebound leaf spring of common construction, and combining in action with it, the quick acting coiled spring, together with devices which render the mechanism efficient and durable.

In the accompanying drawings, which form a part of these specifications, Figure 1 shows the front view of an automobile equipped with our spring suspension. Fig. 2 is a perspective outline of the rear of the leaf spring, together with the sliding hanger and a portion of the axle. Fig. 3 is a section in detail of the spring hanger, its guide, its supporting spring, and also showing the method of its attachment to the axle. Fig. 4 is a detail in perspective of the rear spring suspension.

In Fig. 1 the front coil spring B is secured at either end to arms of the bell crank D and D' on the spring hangers C and C'. The guides D² and D³ are bolted to the axle I and extend upward through the hangers C and C', and terminate in a suitable stop for limiting the upward movement of the hangers C and C'.

In Fig. 3 a bearing washer F on the guide D² acts as a bearing to support the weight of the hanger C as it moves downward. The bearing washer F also serves as a support for the coiled spring G. A sliding collar H rests upon the top of the spring G within the hanger C. The main portion of the hanger C is cylindrical in form and adapted to inclose the spring G. The guide D² extends through an opening in the top of the hanger C, and is provided with a suitable stop for confining the hanger C within the proper limit of its upward movement. The lower end of the collar H, upon which the hanger C rests, is adapted to come in contact with the washer F in confining the hanger C within the proper limit of its downward movement. A lug I, Fig. 3, on the hanger C is adapted to support the end of the spring A. Fig. 2 shows link E supporting the spring A, a swinging movement of the link E acting to compensate for the elongation of the leaf spring under pressure.

Fig. 4 shows in detail the method of attaching the suspension to the rear axle. The guide D² is attached to the axle flange J, which brings the guide D² close to the rear wheel, thus permitting the use of the greatest possible length of leaf spring K within the distance of the distance between the rear wheels.

The action which takes place in our spring suspension when the wheels is in motion is as follows: Shock to the road wheel is absorbed more rapidly by the quick acting coiled spring than by the slow acting friction rebound leaf spring. The recoil of that shock to the road wheel is first absorbed by the coiled spring, and therefore is transmitted to the body of the car and the motion goes through the slow acting leaf spring. So the compression and recoil of the leaf spring is not synchronous with that of the coiled spring the recoil of the coiled spring begins to take place before the full effect of shock to the road wheel can be transmitted through the leaf spring to the body of the car. The car acting effect, as it were, between the coiled spring and the slow acting leaf spring causes a large portion of the effect from vibration to be absorbed by the action of the coiled spring, and the action of the leaf spring taking place almost instantly, the bearing within the spring element for the hanger C instantly reducing the car from any riding

C. C. GAMM & C. F. NELSON.

VEHICLE SPRING.

APPLICATION FILED OCT. 6, 1913.

1,116,878.

Patented Nov. 10, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

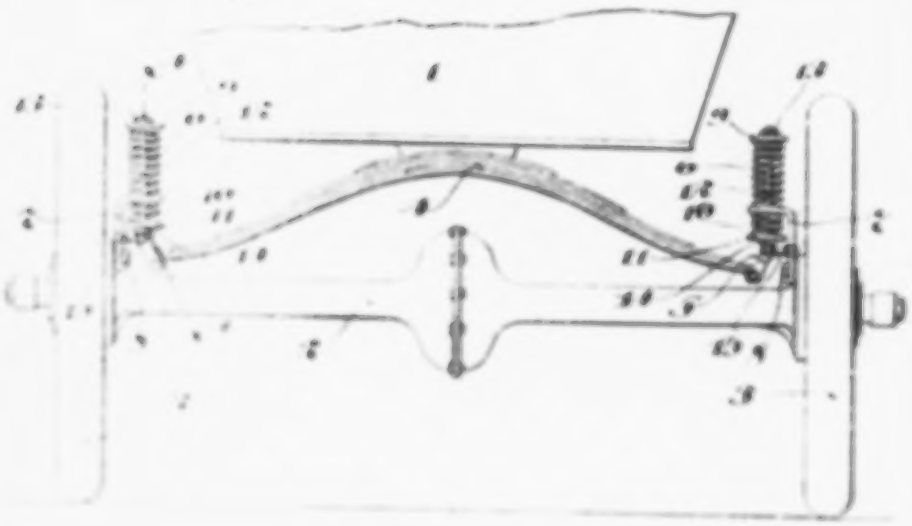
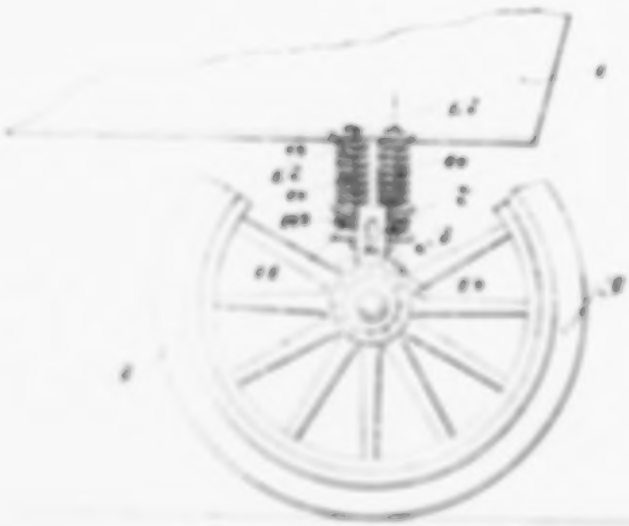


Fig. 2.



Witnesses

C. C. Gamm

C. F. Nelson

Inventors

Charles C. Gamm

Carl F. Nelson

By their Attorneys

Williamson & Merchant

C. C. GAMM & C. F. NELSON.

VEHICLE SPRING.

APPLICATION FILED OCT. 6, 1913.

1,116,878.

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2 SHEETS—SHEET 1.

Fig. 1

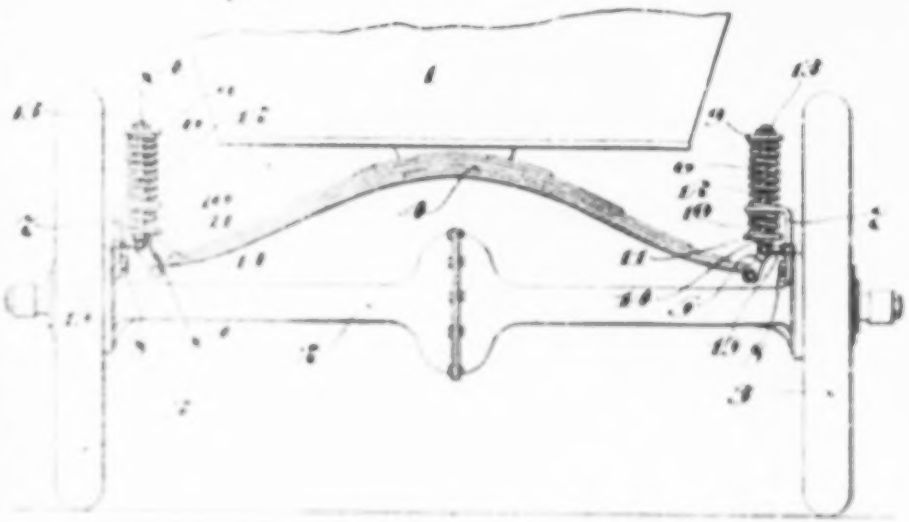
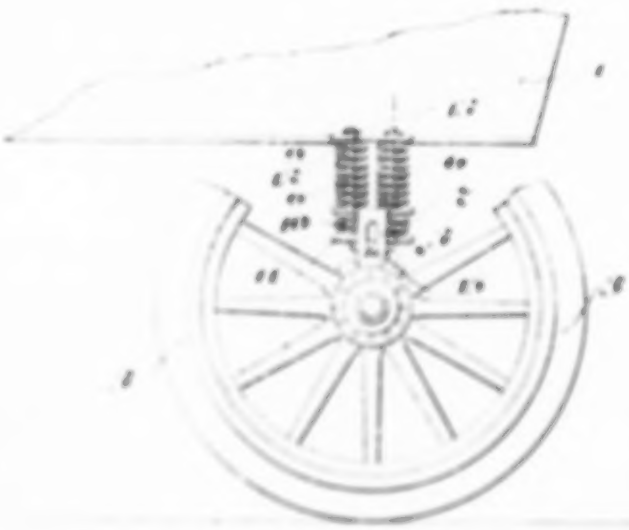


Fig. 2



Witnesses

E. C. Hamlin

A. M. Whitehead

Inventors

Charles C. Gamm

Carl F. Nelson

By their Attorneys

Williamson & Merchant

C. C. GAMM & C. F. NELSON.

VEHICLE SPRING.

APPLICATION FILED OCT. 4, 1913.

1,116,878.

Patented Nov. 10, 1914.

2 SHEETS—SHEET 2.

Fig. 3

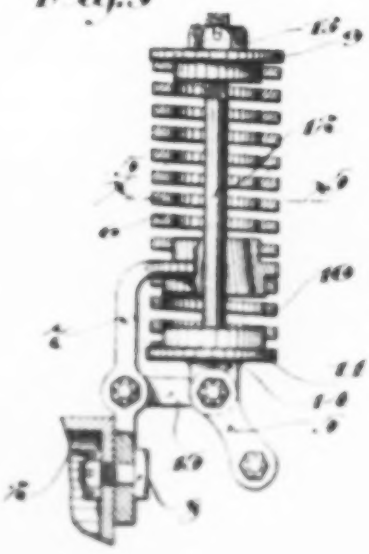


Fig. 4

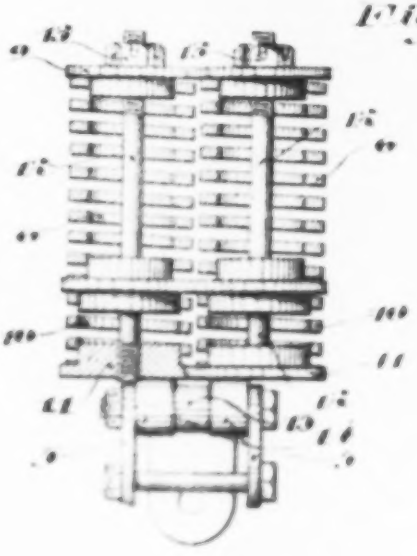


Fig. 5

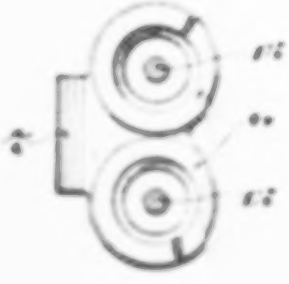
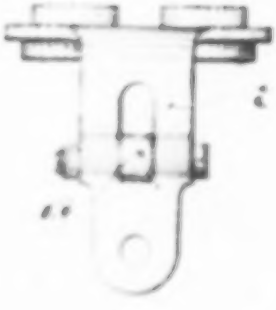


Fig. 6



Witnesses

E. C. Shanks

A. M. Spruhl

Inventors

Charles C. Gamm and

Carl F. Nelson

By their Attorneys

Williamson & Merchant

UNITED STATES PATENT OFFICE.

CHARLES C. GAMM AND CARL F. NELSON, OF MINNEAPOLIS, MINNESOTA.

VEHICLE-SPRING.

1,116,878. Specification of Letters Patent. Patented Nov. 10, 1914.

Application filed October 4, 1913. Serial No. 793,375.

To all whom it may concern:

Be it known that we, CHARLES C. GAMM and CARL F. NELSON, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Vehicle-Springs; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention has for its object to provide an improved vehicle spring, especially adapted for use in connection with automobiles, and to such ends, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claim.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a rear elevation, showing parts of the running gear and body of an automobile, and illustrating our improved spring mechanism arranged to support the latter over the former, some parts being broken away; Fig. 2 is a side elevation of the parts shown in Fig. 1, some parts being broken away; Fig. 3 is a detail in vertical section taken on the line x^3 x^3 of Fig. 2; Fig. 4 is a vertical section taken approximately on the line x^4 x^4 of Fig. 1, some parts being shown in full; Fig. 5 is a horizontal section taken on the line x^5 x^5 of Fig. 3; and Fig. 6 is a view in elevation showing one of the spring supporting brackets.

The numerals 1, 2 and 3 indicate, respectively, the automobile body, the rear axle casing, and the rear wheels.

The numeral 4 indicates a semi-elliptical spring, the intermediate outwardly bowed portion of which is directly connected to the body 1. This spring 4, in the ordinary or old construction, would be connected at its ends by links 5 directly to so-called spring brackets, or other suitable parts on the vehicle running gear. In our improved spring mechanism, the spring 4 is used as a primary spring and its ends are connected to suitable parts of the vehicle running gear, through so-called secondary springs. These secondary springs are preferably coiled springs 6 arranged in pairs on the opposite sides of the vehicle, seated on the laterally inclined ends of so-called spring brackets 7, which, in turn, are bolted or otherwise rigidly secured at 8 to under portions of the rear axle casing 2.

Spring caps 9 are seated on the upper ends of the so-called secondary spring 6. Recoil springs 10 are seated on lower spring caps 11 with their upper ends bearing against the under surfaces of the in-turned ends of the spring brackets 7. The spring caps 9 and 11 and the in-turned ends of the brackets 7 are formed with hubs that telescope into the ends of the coiled springs and keep the same properly alined. Also, the in-turned ends are perforated to afford ample clearance for hanger-bolts 12 that are extended therethrough, and are connected to the spring caps 9 and 11. As shown, the lower ends of the bolts 12 are screwed into the lower caps 11 and the threaded upper ends are loosely passed through the upper caps, and are provided with nuts 13, by adjustments of which the normal tension of the springs 6 and 10 may be varied. In this twin or duplex arrangement of the secondary springs 6 and recoil springs 10, the in-turned portions of the brackets 7 and the spring caps 9 and 11 are each provided with two sets of bosses for engagement with the twin springs; and, of course, two bolts 12 are used to connect each pair of spring caps 9—11.

The links 5 which, as previously noted, are pivotally connected to the ends of the primary spring 4, are pivotally connected at their upper ends to lugs 14 on the bottoms of the lower spring caps 11, and these same lugs are pivotally connected to their inner ends of short thrust links 15, the outer ends of which are pivotally connected to the respective spring brackets 7. Preferably, and as shown, the links 5 are each made up of two short laterally spaced metal straps. The tension of the secondary spring 6 should be so set that, under light loads and under ordinary running conditions, the vibrations will be taken and absorbed by the primary spring 4, but so that, under heavy loads or extreme vibrations, the coiled secondary spring 6 will yield and give increased resiliency, and, also, thereby relieve the primary spring from extreme strains. The thrust links 15 permit free movements of the springs 4 and 6 but hold the body of the vehicle and the primary spring 4 against

lateral movements transversely of the running gear. The recoil springs 10 prevent bounding, and the primary and secondary springs recoil after a sudden and extreme depression.

The improved spring mechanism described, while simple and of small cost, makes the vehicle easy riding and self-adjusting to varying loads and to varying shocks.

What we claim is:—

The combination with the running gear and body of a vehicle, of a primary spring secured to said body, a spring bracket on said running gear, a hanger rod working through a passageway in said spring bracket, upper and lower spring caps on said hanger rod, a secondary spring compressed between said spring bracket and said upper spring cap, a recoil spring compressed between said spring bracket and said lower spring cap, and a toggle link pivotally connected at its joint to the lower end of said hanger rod and pivotally connected at one of its ends to said primary spring and at its other end to said spring bracket, the end of said toggle link which is pivotally connected to said spring bracket holding said hanger rod against lateral swinging movement under the action of said primary spring.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES C. GAMM.
CARL F. NELSON.

Witnesses,
EMILY M. KING,
HARRY D. KILCOUR.